ECOLOGY

ALL FORMS OF LIFE IN RELATION TO ENVIRONMENT

OFFICIAL PUBLICATION OF THE
ECOLOGICAL SOCIETY OF AMERICA

VOLUME 42, 1961

PUBLISHED QUARTERLY AT DURHAM, N. C.
BY THE
ECOLOGICAL SOCIETY OF AMERICA
AND THE
DUKE UNIVERSITY PRESS

ECOLOGY

A QUARTERLY JOURNAL

DEVOTED TO ALL PHASES OF ECOLOGICAL BIOLOGY

Established 1920

Editors: LaMont C. Cole (Zoology), Cornell University.
Alton A. Lindsey (Botany), Purdue University.

Review Editor: R. H. Whittaker, Brooklyn College.

Business Manager: H. J. Oosting, Duke University.

Circulation Office: Duke University Press, Box 6697, College Station, Durham, N. C.

MEMBERS OF THE EDITORIAL BOARD

1959-61

Willis A. Eggler, Newcomb College of Tulane University, New Orleans, Louisiana.
John A. King, Department of Zoology, Michigan State University, East Lansing, Michigan.
Robert W. Pennak, Department of Biology, University of Colorado, Boulder, Colorado.
Elroy L. Rice, Department of Plant Science, University of Oklahoma, Norman, Oklahoma.
Frederick E. Smith, Department of Zoology, University of Michigan, Ann Arbor, Michigan.
Forest W. Stearns, Lake States Forest Experiment Station, U. S. Forest Service, St. Paul, Minnesota.

1960-62

W. Frank Blair, Department of Zoology, University of Texas, Austin, Texas.
John L. Blum, Department of Biology, Canisius College, Buffalo, New York.
Robert A. Darrow, Department of Range and Forestry, Agricultural and Mechanical College of Texas, College Station, Texas.
George G. Gyrisco, Department of Entomology, Cornell University, Ithaca, New York.
Royal E. Shanks, Department of Botany, University of Tennessee, Knoxville, Tennessee.
John M. Teal, Woods Hole Oceanographic Institute, Woods Hole, Massachusetts.

1961-63

William C. Ashby, Department of Botany, Southern Illinois University, Carbondale, Illinois.
J. Roger Bray, Department of Botany, University of Toronto, Ontario, Canada.
Frank A. Pitelka, Museum of Vertebrate Zoology, University of California, Berkeley, California.
Loren D. Potter, Department of Biology, University of New Mexico, Albuquerque, New Mexico.
Earl R. Rich, Department of Zoology, University of Miami, Coral Gables, Florida.
Donald E. Wohlschlag, Natural History Museum, Stanford University, Stanford, California.

Ex officio members: H. J. Oosting, Duke University, Durham, North Carolina, and Francis C. Evans, University of Michigan, Ann Arbor, Michigan (the editors of Ecological Monographs).

Correspondence concerning editorial matters should be addressed to the appropriate Editor at the address given in the inside first cover. Books and papers for review should be sent to the Review Editor, Dr. R. H. Whittaker, Department of Biology, Brooklyn College, Brooklyn 10, New York.

Subscription price in the United States, Canada, and the Pan-American countries, $9.00 net a year for complete volumes (January-October); other foreign countries—$.60 a year additional for postage. Parts of volumes are to be had only at the single copy rate. Current single copies, $2.50. Back volumes, as available, $11.00 each plus postage. Back single issues, $3.00.

Missing numbers will be supplied free when lost in the mails if written notice is received within one month of the date of issue of next succeeding number.

Remittances for subscriptions should be made payable to Duke University Press.

Remittances for dues should be made payable to the Ecological Society of America.

Business correspondence, including subscriptions, change of address, back numbers, and discontinuances, should be addressed to Circulation Office, Duke University Press, Box 6697, College Station, Durham, N. C. Correspondence regarding payment of dues in the Ecological Society should be addressed to the Treasurer, Kirby L. Hayes, Department of Zoology and Entomology, Alabama Polytechnic Institute, Auburn, Alabama.

Second-class postage paid at Durham, N. C.

TABLE OF CONTENTS, VOLUME 42, 1961

COOKE, WM. BRIDGE. Pollution effects on the fungus population of a stream 1– 18

BILLINGS, W. D. AND A. F. MARK. Interactions between alpine tundra vegetation and patterned ground in the mountains of southern New Zealand 18– 31

HOUSTON, WALTER R. Some interrelations of sagebrush, soils and grazing intensity in the northern Great Plains 31– 38

PELTON, JOHN. An investigation of the ecology of *Mertensia ciliata* in Colorado 38– 53

LOTSPEICH, FREDERICK B., JACK B. SECOR, ROSE OKAZAKI AND HENRY W. SMITH. Vegetation as a soil-forming factor on the Quillayute physiographic unit in western Clallam County 58– 68

TINKLE, DONALD W. Geographic variation in reproduction, size, sex ratio and maturity of *Sternothaerus odoratus* (Testudinata: Chelydridae) 68– 76

BROWER, LINCOLN P. Studies on the migration of the monarch butterfly. I. Breeding population of *Danaus plexippus* and *D. glippus berenice* in South Central Florida 76– 83

REISH, DONALD J. A study of benthic fauna in a recently constructed boat harbor in southern California 84– 91

SHERIDAN, WILLIAM L. Temperature relationships in a pink salmon stream in Alaska ... 91– 98

BLAIR, W. FRANK. Calling and spawning seasons in a mixed population of anurans 99–110

GETZ, LOWELL L. Factors influencing the local distribution of Microtus and Synaptomys in southern Michigan 110–119

CONOVER, ROBERT J. A study of Charlestown and Green Hill ponds, Rhode Island 119–140

KNIGHT, CLIFFORD B. The Tomocerinae (Collembola) in old field stands of North Carolina 140–149

GOODBODY, IVAN. Mass mortality of a marine fauna following tropical rains 150–155

GIBOR, AHRON AND WILLIAM R. MEEHAN. Diurnal variations in chlorophyll *a* content of some fresh water algae 156–157

MASON, HERBERT L. AND JEAN H. LANGENHEIM. Natural selection as ecological concept 158–165

KILBURN, PAUL D. Summer phytoplankton at Coos Bay, Oregon 165–166

MAJOR, JACK. Use in plant ecology of causation, physiology, and a definition of vegetation 167–169

LANNER, RONALD M. Living stumps in the Sierra Nevada 170–173

HICKEY, WAYNE C., JR. Growth forms of crested wheatgrass as affected by site and grazing 173–176

WHITTAKER, R. H. Estimation of net primary production of forest and shrub communities 177–180

HARTMAN, RICHARD T. AND CRAIG L. HIMES. Phytoplankton from Pymatuning Reservoir in downstream areas of the Shenango River 180–183

OTA, KASIO AND E. W. JAMESON, JR. Ecological relationships and economic importance of Japanese microtinae 184–186

ODUM, EUGENE P. AND A. J. PONTIN. Population density of the underground ant, *Lasius flavius*, as determined by tagging with P^{32} 186–188

CARPELAN, LARS H. AND RICHARD H. LINSLEY. The spawning of *Neanthes succinea* in the Salton Sea 189–190

HARTENSTEIN, ROY. On the distribution of forest soil microarthropods and their fit to "contagious" distribution functions 190–194

BULLIS, HARVEY R., JR. Observations on the feeding behavior of white-tip sharks on schooling fishes 194–195

FERGUSON, DENZEL E. AND JAMES D. LAND. Some temperature studies on the beetle, *Populius disjunctus* 195–197

HUBBARD, RICHARD L. AND STURGIS MCKEEVER. Meadow mouse girdling—another cause of death of reseeded bitterbrush plants 198

CARPENTER, CHARLES C. AND GENE GRUBITZ, III. Time-motion study of a lizard 199–200
GORDON, ROBERT E. The movement of displaced green salamanders 200–202
TALBOT, MARY. Mounds of the ant *Formica ulkei* at the Edwin S. George Reserve, Livingston County, Michigan 202–205
WILLIAMS, LOUIS G. AND QUENTIN PICKERING. Direct and food-chain uptake of cesium^{137} and strontium^{85} in bluegill fingerlings 205–206
KORNICKER, LOUIS S. Observations of the behavior of the littoral gastropod *Terebra salleana* 207
DINGLE, HUGH. Correcting behavior in boxelder bugs 207–211
SORENSON, M. W. AND JOHN TWENTE. A timing device suitable for field studies under adverse conditions 212
KENNINGTON, GARTH S. The influence of temperature and atmposheric pressure on the rate of oxygen uptake in *Tribolium confusum* 212–215
UHLER, LOWELL D. Mortality of the goldenrod gall fly, *Eurosta solidaginis*, in the vicinity of Ithaca, New York 215–216
WELLS, HARRY W., MARY JANE WELLS AND I. E. GRAY. Winter fish mortality in Pamlico Sound, North Carolina 217–219
NAYLOR, ALFRED F. Dispersal in the red flour beetle *Tribolium castoneum* (Tenebrionidae) 231–237
STROSS, RAYMOND G., JOHN C. NEESS AND A. D. HASLER. Turnover-time and production of the planktonic crustacea in limed and reference portion of a bog lake 237–245
WIEGERT, RICHARD G. Respiratory energy loss and activity patterns in the meadow vole, *Microtus pennsylvanicus pennsylvanicus* 245–253
COX, GEORGE W. The relation of energy requirements of tropical finches to distribution and migration 253–266
HAZELWOOD, DONALD H. AND RICHARD A. PARKER. Population dynamics of some freshwater zooplankton 266–274
GRAY, GRACE-ANN AND HOWARD E. WINN. Reproductive ecology and sound production of the toadfish, *Opsanus tau* 274–282
GOLDMAN, CHARLES R. The contribution of alder trees (*Alnus tenuifolia*) to the primary productivity of Castle Lake, California 282–288
TERMAN, C. RICHARD. Some dynamics of spatial distribution within semi-natural populations of prairie deermice 288–302
CROSSLEY, D. A., JR., AND HENRY F. HOWDEN. Insect-vegetation relationships in an area contaminated by radioactive wastes 302–317
MACKENZIE, CLYDE L., JR. Growth and reproduction of the oyster drill *Eupleura caudata* in the York River, Virginia 317–338
POTTER, LOUISE F. AND GLADYS E. BAKER. The microbiology of Flathead and Rogers Lakes, Montana. II. Vertical distribution of the microbial populations and chemical analyses of their environments 338–348
DETLING, LEROY E. The chaparral formation of Southeastern Oregon, with consideration of its postglacial history 348–357
MAYCOCK, PAUL F. The spruce-fir forests of the Keweenaw Peninsula, Northern Michigan 357–365
SHARP, WARD M. AND HENRY H. CHISMAN. Flowering and fruiting in the white oaks. I. Staminate flowering through pollen dispersal 365–372
PARKER, JOHNSON. Seasonal trends in carbon dioxide absorption, cold resistance, and transpiration of some evergreens 372–380
PARKER, BRUCE C. Facultative heterotrophy in certain soil algae from the ecological viewpoint 381–386
ROSS, PHILIP. Plant ecology of the teak plantations in Trinidad 387–398
MCKEEVER, STURGIS. Relative populations of small mammals in three forest types of Northeastern California 399–402
EVANS, DAVID GORDON. A portable visual photometer for the measurement of very low light intensities 402–403

SMITH, FREDERICK E. Density dependence in the Australian thrips 403–407
JOHNSON, DONALD R. The food habits of rodents on rangelands of Southern Idaho 407–410
STAINS, HOWARD J. Comparison of temperatures inside and outside two tree-dens used by raccoons 410–413
MARKERT, ROBERT E., BETSY J. MARKERT, AND NANCY L. VERTREES. Lunar periodicity in spawning and luminescence in *Odontosyllis enopla* 414–415
WEAVER, HAROLD. Ecological changes in the ponderosa pine forest of Cedar Valley in Southern Washington 416–420
ROWE, J. S. The level-of-integration concept and ecology 420–427
BUELL, MURRAY F. AND WILLIAM E. MARTIN. Competition between maple-basswood and fir-spruce communities in Itasca Park, Minnesota 428–429
BRISCOE, C. B. Germination of cherrybark and Nuttall oak acorns following flooding 430–431
LINDSEY, ALTON A. Vegetation of the drainage-aeration classes of Northern Indiana soils in 1830 432–436
FRITTS, HAROLD C. An analysis of maximum summer temperatures inside and outside a forest 436–440
SHIELDS, LORA MANGUM, L. W. DURRELL AND ARNOLD H. SPARROW. Preliminary observations in radiosensitivity of algae and fungi from soils of the Nevada Test Site 440–441
JEFFREY, W. W. A prairie to forest succession in Wood Buffalo Park, Alberta 442–444
RYTHER, JOHN H. AND DANA D. KRAMER. Relative iron requirement of some coastal and offshore plankton algae 444–446
HURD, RICHARD M. Grassland vegetation in the Big Horn Mountains, Wyoming 459–467
POTTER, LOREN D. AND D. ROSS MOIR. Phytosociological study of burned deciduous woods, Turtle Mountains, North Dakota 468–480
LANGE, A. H. The effect of temperature and photoperiod on the growth of *Carica papaya* 481–486
LATTING, JUNE. The biology of *Desmanthus illinoensis* 487–493
COOPER, CHARLES F. Pattern in ponderosa pine forests 493–499
LAESSLE, ALBERT M. A micro-limnological study of Jamaican bromeliads 499–517
GABBUTT, PETER D. The distribution of some small mammals and their associated fleas from central Labrador 518–525
HINCKLEY, ALDEN D. Comparative ecology of two beetles established in Hawaii: an anthribid, *Araecerus levipennis,* and a bruchid, *Mimosestes sallaei* 526–532
WATERS, THOMAS F. Standing crop and drift of stream bottom organisms 532–537
SOUTHWICK, CHARLES H., MIRZA AZHAR BEG, AND M. RAFIQ SIDDIQI. A population survey of Rhesus monkeys in villages, towns, and temples of northern India 538–547
STIVEN, ALAN E. Food energy available for and required by blue grouse chick 547–553
DARNELL, REZNEAT M. Trophic spectrum of an estuarine community, based on studies of Lake Pontchartrain, Louisiana 553–568
LEMS, KORNELIUS. Botanical notes on the Canary Islands.. III. The life form spectrum and its interpretation 569-572
SWEENEY, JAMES R. AND HAROLD H. BISWELL. Quantitative studies on the removal of litter and duff by fire under controlled conditions 572–575
BLYDENSTEIN, JOHN. The Russian school of phytocenology 575–577
FRIEND, D. T. C. A simple method of measuring integrated light values in the field 577–580
GOLLEY, FRANK B. Energy values of ecological materials 581–584
HABERLAND, F. P. AND S. A. WILDE. Influence of thinning of red pine plantation on soil .. 584–586
WEBSTER, GRADY L. The altitudinal limits of vascular plants 587–590
WHITEHEAD, DONALD R. A note on silocone oil as a mounting medium for fossil and modern pollen 591
KADLEC, JOHN A. A further comment on the ecology of woolgrass (*Scripus cyperinus*) 591–592
BARNES, H. *Balanus balanoides:* recent observation on its southern limit 592–593